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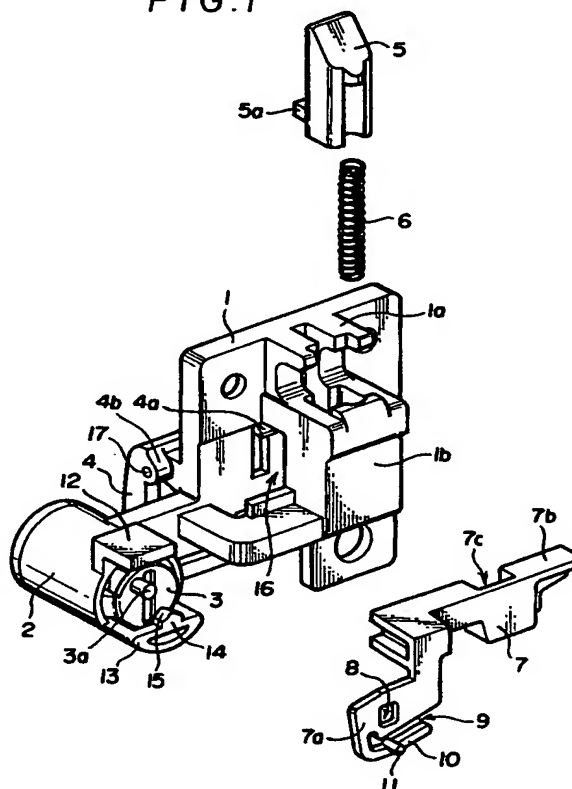
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**DE FR GB**(71) Applicant: **Kato Hatsujo Kaisha Ltd.**  
**51 Iwai-cho Hodogaya-ku**  
**Yokohama-shi Kanagawa-ken(JP)**(72) Inventor: **Sato, Seichi**  
**30-8, Motoohashi 1-chome, Sakae-ku**  
**Yokohama-shi, Kanagawa-ken(JP)**  
Inventor: **Sawatani, Seiji**  
**1109-20, Tsurugamine Honcho, Asahi-ku**  
**Yokohama-shi, Kanagawa-ken(JP)**(74) Representative: **Lewald, Dietrich, Dipl.-Ing.**  
**Patentanwalt Pienzenauerstrasse 2**  
**W-8000 München 80 (DE)**(54) **Locking device for lid.**

(57) A locking device for a lid on a box includes a frame (1) fixed on the side of the lid, provided with a cylinder lock (3) having an eccentric shaft (3a) and formed with a cylindrical retaining part (2) for retaining the cylinder lock (3) therein; an opening-shutting knob (4) having a depressing claw part (4a) and pivotally supported on the frame (1); a locking member (5) for locking on the side of the frame (1) a striker (20) disposed on the side of the box; and an operating lever (7) having one terminal part (7a) thereof connected to the eccentric shaft (3a) of the cylinder lock (3) and the other terminal part (7a) thereof serving to release a locked state of the locking member (5) by interfering with the depressed claw part (4a) of the opening-shutting knob (4) during unlocking of the locking device. The operating lever (7) is formed of a synthetic resin material and has an elastic engaging piece (10) integrally formed on the side of the one terminal part (7a). The elastic engaging piece (10) has a projecting part (11) formed thereon. The frame (1) has formed on the side of the cylindrical retaining part (2) a stopper wall (14) provided with a changeover slide surface (15). The stopper wall (14) has the elastic engaging piece (10) set in place fast on an inner side thereof. The projecting part (11) of the elastic engaging piece (10) is moved on the changeover slide surface (15) of the stopper wall (14).

**FIG. 1**

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention:

This invention relates to a key operation type locking device used in a lid for opening and shutting a varying box such as, for example, an automobile glove compartment.

### 2. Description of the Prior Art:

The locking devices of this class heretofore known to the art include those which are disclosed in Japanese Utility Model Public Disclosure No. 60-162663, No. 63-78670 and No. 1-151571 and Japanese Patent Public Disclosure No. 61-130576, for example.

Though these conventional locking devices are more or less different in construction from one another, they basically comprise a frame provided with a cylinder lock to be fixed in the lid of a glove compartment, an opening-shutting knob pivotally supported on the front surface side of the frame, a storing part formed on the rear surface side of the frame and adapted to store therein a striker disposed on the compartment side, a locking member disposed vertically movably or rotatably and adapted to open or shut the opening of the storing part, an operating lever adapted to urge the motion of the locking member and provided on one terminal part thereof with a connecting hole, and an eccentric shaft disposed on the rear terminal of the cylinder lock and inserted idly inside the connecting hole, whereby the interlock of the rotation of the cylinder lock with the motion of the operating lever enables the other terminal part of the operating lever to be moved between the position at which the operating lever interferes with a depressing claw part disposed on the rear side of the opening-shutting knob and the position at which the interference is not produced.

When the key for initiating actual use of the locking device is operated so as to rotate the cylinder lock in the unlocking direction, move the other terminal part of the operating lever to the position allowing interference thereof with the depressing claw part of the opening-shutting knob, then pull up the opening-shutting knob in spite of the resilient pressure tending to return the opening-shutting knob, and cause the depressing claw part of the knob to depress the other terminal part of the operating lever downwardly, the depression of the operating lever produced on the other terminal part side thereof causes the locking member to move in the direction of opening the storing part, effects automatic release of the locking state relative to the striker inside the storing part, and consequently warrants release of the lid

from the glove compartment.

When the cylinder lock is rotated in the locking direction, since the other terminal part of the operating lever this time moves to the position not allowing interference thereof with the depressing claw part of the opening-shutting knob, then the depressing claw part of the knob simply swings idly even if the opening-shutting knob in that state of the locking device may be pulled up time and again. Thus, the lid is allowed to remain infallibly in the closed state.

In the conventional locking device of this operating principle, however, since the operating lever which fulfills the role of keeping the locking device in the locked or unlocked state is shaped in a one-piece component with a metallic material and this operating lever made of metal has one terminal part thereof simply inserted idly in the eccentric shaft of the cylinder lock through the connecting hole, the prevention of accidental fall of one terminal part side of the operating lever necessitates a contrivance to have the one terminal part of the operating lever to be supported on the cylinder lock side by using a fall-preventing part such as the so-called push-on fix.

The conventional locking device, therefore, not only renders the assembly work of the metallic operating lever troublesome but also entails a problem of inevitably increasing the number of component parts and further requires the metallic operating lever to be subjected to a rustproofing surface treatment. This point constitutes one factor for increasing the cost of production and possibly adding to the weight of the device itself.

Further, for the purpose of preventing the opening-shutting knob from producing unwanted backlash and resiliently urging the opening-shutting knob to the home position, the conventional locking device adopts a construction in which a double-torsion spring for return operation is mounted on the supporting shaft serving to support the opening-shutting knob pivotally on the frame so that the resilient pressure of the double-torsion spring will urge the opening-shutting knob to the home position. The use of the double-torsion spring of this nature is advantageous in that this spring is capable of infallibly urging the opening-shutting knob to the home position. In contrast, when the opening-shutting knob is attached to the frame, the work of attaching this opening-shutting knob in particular has the disadvantage that the operational efficiency of this work is inferior in respect that the double-torsion spring must be attached to the supporting shaft and, at the same time, the operating-shutting knob must be attached to the frame, while the supporting shaft must be inserted through the bearing on the opening-shutting knob side and the bearing on

the frame side.

The main object of this invention is to provide an improved locking device which is capable of effectively solving the problems of the conventional locking device described above.

## SUMMARY OF THE INVENTION

To accomplish the above object, according to the present invention there is provided a locking device for a lid on a box, comprising a frame fixed on the side of the lid, provided with a cylinder lock having an eccentric shaft and formed with a cylindrical retaining part for retaining the cylinder lock therein, an opening-shutting knob having a depressing claw part and pivotally supported on the frame, a locking member for locking on the side of the frame a striker disposed on the side of the box, and an operating lever having one terminal part thereof connected to the eccentric shaft of the cylinder lock and the other terminal part thereof serving to release a locked state of the locking member by interfering with the depressed claw part of the opening-shutting knob during unlocking of the locking device, the operating lever being formed of a synthetic resin material and having an elastic engaging piece integrally formed on the side of the one terminal part, the elastic engaging piece having a projecting part formed thereon, the frame having formed on the side of the cylindrical retaining part a stopper wall provided with a changeover slide surface, the stopper wall having the elastic engaging piece set in place fast on an inner side thereof, the projecting part of the elastic engaging piece being moved on the changeover slide surface of the stopper wall.

The other objects and features of this invention will become apparent from the detailed description of the invention to be given herein below with reference to the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a partially exploded rear perspective view of a locking device for a lid as one embodiment of this invention.

Figure 2 is a partially exploded front perspective view of the locking device.

Figure 3 is a rear perspective view of the locking device in an assembled state.

Figure 4 is a rear view of the locking device in an unlocked state.

Figure 5 is a plan view of the locking device in an unlocked state.

Figure 6 is a cross section of the locking device in a state in which a lid is shut.

Figure 7 is a cross section of the locking device in a state in which the lid is opened by raising

an opening-shutting knob.

Figure 8 is a rear view of the locking device in a locked state.

Figure 9 is a plan view of the locking device in a locked state.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now, this invention will be described in detail below with reference to one embodiment illustrated in the drawings.

The locking device according to this invention has been developed for use in a lid which is provided for an automobile glove compartment. As illustrated in Figure 1, the basic construction of the locking device comprises a frame 1 made of synthetic resin and fixed to a lid (not shown), a cylindrical retaining part 2 concurrently serving as an outer case for a cylinder lock 3 and integrally extending from one lateral part of the frame, the cylinder lock 3 rotatably inserted inside the cylindrical retaining part 2, an opening-shutting knob 4 pivotally supported on the front surface side of the frame 1, a storing part 1a of a cross section of the shape of three sides of a square formed on the rear surface side of the frame 1 and adapted to store a striker 20 (Figure 6 or Figure 7) disposed on the glove compartment (not shown) side, a guide cylinder part 1b formed below the storing part 1a, a locking member 5 adapted to open or shut the opening of the storing part 1a and pivotally supported in a vertically movable manner inside the guide cylinder part 1b, and a coil spring 6 adapted to utilize the resilient pressure thereof for keeping the locking member 5 urged constantly in the direction of shutting the opening of the storing part 1a.

With the basic construction described above taken as a precondition, the present embodiment additionally adopts a construction which comprises an operating lever 7 shaped in a one-piece component with a synthetic resin material and adapted to promote the motion of the locking member 5, a connection hole 8 formed substantially in the central part of one terminal part 7a of the operating lever 7 and adapted to allow idle insertion of an eccentric shaft 3a formed in the rear terminal of the cylinder lock 3, an elastic engaging piece 10 integrally formed below the aforementioned one terminal part 7a through a laterally L-shaped slit 9, and a pin-like projecting part 11 formed on the lateral surface of the elastic engaging piece 10, provided the other terminal part 7b of the operating lever 7 is shaped so as to engage with the projecting pin 5a of the locking member 5 and, at the same time, interfere with a depressing claw part 4a raised from the rear surface side of the opening-

shutting knob 4 and a depressed shelter part 7c adapted to preclude the otherwise inevitable interference of the opening-shutting knob 4 with the depressing claw part 4a is formed at a position separated from the other terminal part 7b toward the center. The position at which the projecting part 11 is formed needs not be limited to the lateral surface of the elastic engaging piece 10. The projecting part 11 may be formed in a convex shape at a suitable position on the lower surface side of the elastic engaging piece 10 to suit the particular manner of the embodiment.

The present embodiment further adopts a construction which comprises upper and lower guide walls 12 and 13 integrally extending from the upper and lower parts of the rear terminal edge of the cylindrical retaining part 2 intended for insertion therein of the cylinder lock 3, the upper and lower guide walls 12 and 13 adapted to allow one terminal part 7a of the operating lever 7 to be driven in therebetween, and a stopper wall 14 provided with an angular changeover slide surface 15 and integrally formed at the leading terminal part of the lower guide wall 13, provided the elastic engaging piece 10 of the operating lever 7 is resiliently engaged with the inner side of the stopper wall 14 and the projecting part 11 of the elastic engaging piece 10 is switchably moved on the changeover slide surface 15 of the stopper wall 14.

Further, as respects the contrivance for pivotally supporting the opening-shutting knob 4 on the front surface side of the frame 1 through a supporting shaft 17, the present embodiment adopts a construction which, as specifically illustrated in Figure 2, comprises convex retaining parts 18a and 18b respectively formed integrally on the upper rear surface side of the opening-shutting knob 4 and the front surface side of the frame 1 corresponding to and facing the rear surface of the knob 4 and a single return-motion compression coil spring 19 directly set in place between the opposed surfaces of the retaining parts 18a and 18b. These retaining parts 18a and 18b need not be limited to convex shape mentioned above. They may be formed in a concave shape or one of them may be formed in a convex shape and the other in a concave shape to suit the convenience of the embodiment so long as they are capable of readily retaining the terminal parts of the compression coil spring 19. In Figure 2, 4b designates a bearing part of the opening-shutting knob 4 side and 1c for a bearing part of the frame 1, both for the supporting shaft 17.

In the locking device constructed as described above, therefore, the elastic engaging piece 10 on the one terminal part 7a side is bent inwardly through the slit 9 and caused to ride over the stopper wall 14 and automatically brought into re-

silient engagement with the inner side of the stopper wall 14 by having the coil spring 6 and the locking member 5 supported in place inside the guide cylinder part 1b of the frame 1, inserting the other terminal part 7b of the operating lever 7 into a notch 16 formed in the lateral surface of the guide cylinder part 1b, causing the other terminal part 7b to come into engagement downwardly with the projecting pin 5a of the locking member 5, idly inserting the eccentric shaft 3a in the connection hole 8 formed in one terminal part 7a of the operating lever 7, and driving the one terminal part 7a of the operating lever 7 in the space intervening between the upper and lower guide walls 12 and 13 of the cylindrical retaining part 2. As a result, the one terminal part 7a of the operating lever 7 is infallibly supported in place on the frame 1 side as illustrated in Figure 3.

In the present embodiment, therefore, the operating lever 7 can be infallibly fastened on the frame 1 side simply by a single depressing operation without requiring use of such a fall-preventing part as is indispensably used in the conventional locking device.

Further, in the locking device of the present embodiment, since one compression coil spring 19 is used as spring means for return motion in the place of the conventional double-torsion spring, the compression coil spring 19 for return motion can be set in place between the retaining parts 18a and 18b by the use of a simple jig even after the opening-shutting knob 4 has been pivotally supported on the frame 1 side through the supporting shaft 17. As a result, the work of setting the opening-shutting knob 4 in place can be simplified to a great extent.

When the key for initiating actual use of the locking device is manipulated to rotate the cylinder lock 3 in the unlocking direction and set the locking device in the unlocked state, the operating lever 7 is moved in the direction of the cylinder lock 3 as synchronized with the rotation of the cylinder lock 3 and the other terminal part 7b of the operating lever 7 is moved to below the depressing claw part 4a of the opening-shutting knob 4 as illustrated in Figure 4. Thereafter, by pulling up the opening-shutting knob 4 in spite of the resilient pressure of the compression coil spring 19 for return motion to cause a change of the state illustrated in Fig. 6 to that in Fig. 7 and depressing the other terminal part 7b side of the operating lever 7 downwardly by means of the depressing claw part 4a of the knob 4, the locking member 5 is lowered as synchronized with the depression of the other terminal part 7b in spite of the resilient pressure of the coil spring 6 and the locked state relative to the striker 20 inside the storing part 1a is dissolved. As a result, release of the lid from the glove compart-

ment can be ensured.

While the locking device is in the unlocked state, desired shutting of the lid is attained by moving the lid in the shutting direction, thereby causing the striker 20 this time to lower the locking member 5 forcibly, enter the storing part 1a through the opening now in an open state, and automatically lock itself inside the storing part 1a. Thus, the lid assumes the shut state readily.

In this case, when the locking member 5 is lowered, the opening-shutting knob 4 is liberated from the resilient pressure of the coil spring 6 and consequently allowed to assume a free state. At this time, owing to the resilient pressure of the compression coil spring 19 for return motion, the opening-shutting knob 4 is prevented from accidentally generating a backlash and urged resiliently toward the home position.

To use the locking device for protection against theft, the key is manipulated to move the cylinder lock 3 in the reverse direction, i.e. in the locking direction, so that the operating lever 7 is moved in the direction of departing from the cylinder lock 3 as synchronized-with the rotation of the cylinder lock 3, as shown in Figure 8 and Figure 9, and the shelter part 7c of the operating lever 7 is caused to assume a position below the depressing claw part 4a of the opening-shutting knob 4. When the knob 4 is pulled up time and again in this state, the depressing claw part 4a of the knob 4 is swung in the open space and the operating lever 7 cannot be depressed downwardly. Thus, the locking device is enabled to assume the locked state infallibly. Again in this case, since the opening-shutting knob 4 is kept without fail under the influence of the resilient pressure of the compression coil spring 19, it is prevented from generating a backlash accidentally and kept urged in the direction of the home position.

Further, in the present embodiment, when the operating lever 7 is moved in the lateral direction through the eccentric shaft 3a in consequence of the rotation of the cylinder lock 3 no matter whether the locking device is being unlocked or locked, the projecting part 11 of the elastic engaging piece 10 climbs over the angular changeover slide surface 15 of the stopper wall 14 and continues its motion as illustrated in Figure 4 and Figure 8. This climb of the projecting part 11 over the angular changeover slide surface 15 always produces a distinct click and consequently enhances the feeling of the key operation and, at the same time, facilitates confirmation of the locked state and the unlocked state apart from each other.

Then, the construction which allows the projecting part 11 of the elastic engaging piece 10 to be positioned alternately on the opposite sides of the changeover slide surface 15 of the stopper wall 14

in the manner described above enables the one terminal part 7a of the operating lever 7 to be positioned preparatorily by making use of the sliding surface 15 of the stopper 14. Unlike the conventional construction, therefore, even when the cylinder lock 3 is set in place later inside the cylindrical retaining part 2 of the frame 1, the work of making the connection hole 8 of the one terminal part 7a coincide with the eccentric shaft 3a of the cylinder 3 is facilitated. This easiness of the work proves to be highly advantageous.

In accordance with this invention, as described above, when the elastic engaging piece formed at the one terminal part of the operating lever is bent inwardly and, at the same time, pressed forcibly on the cylinder lock side, this elastic engaging piece is automatically fixed in place on the inner side of the stopper wall formed on the cylindrical retaining part side and the one terminal part of the operating lever is infallibly retained on the cylinder lock side. As a result, the locking device of this invention enables the one terminal part of the operating lever to be set in place fast by a single operation acting on the cylinder lock side without requiring use of the conventionally indispensable fall-preventing part. Further, since this operating lever is formed of a synthetic resin material, the locking device enjoys a generous reduction in weight and an ample decrease of the cost of production.

When the operating lever is moved in the locking or unlocking direction through the eccentric shaft in consequence of the rotation of the cylinder lock generated by means of the key, the projecting part formed on the elastic engaging piece climbs over the changeover slide surface of the stopper wall and continues its motion. This motion produces a distinct click when the projecting part has climbed over the changeover slide surface and consequently enhances the feeling of the key operation and facilitates confirmation of the locked state and the unlocked state apart from each other. This fact constitutes an additional advantage of this invention.

Moreover, this invention keeps the opening-shutting knob from producing a backlash and enables it to be resiliently urged infallibly toward the home position simply by having the retaining parts formed one each on the opposed surfaces of the opening-shutting knob and the frame and setting in place the compression coil spring for return motion between the opposed retaining parts. Even from this point of view, this invention can be expected to allow ample improvement in the operational efficiency of the work of assembling component parts as compared with the conventional locking device. In any event, this feature contributes to lowering the cost of the locking device.

## Claims

1. A locking device for a lid on a box, comprising:
  - a frame (1) fixed on the side of the lid, provided with a cylinder lock (3) having an eccentric shaft (3a), and formed with a cylindrical retaining part (2) for retaining said cylinder lock (3) therein;
  - an opening-shutting knob (4) having a depressing claw part (4a) and pivotally supported on said frame (1);
  - a locking member (5) for locking on the side of said frame a striker (20) disposed on the side of the box; and
  - an operating lever (7) having one terminal part (7a) thereof connected to said eccentric shaft (3a) of said cylinder lock (3) and the other terminal part (7a) thereof serving to release a locked state of said locking member by interfering with said depressed claw part (4a) of said opening-shutting knob (4) during unlocking of said locking device;
  - said operating lever (7) being formed of a synthetic resin material and having an elastic engaging piece (10) integrally formed on the side of said one terminal part (7a), said elastic engaging piece (10) having a projecting part (11) formed thereon;
  - said frame (1) having formed on the side of said cylindrical retaining part a stopper wall (14) provided with a changeover slide surface, said stopper wall (14) having said elastic engaging piece (10) set in place fast on an inner side thereof;
  - said projecting part (11) of said elastic engaging piece (10) being moved on said changeover slide surface (15) of said stopper wall (14).
2. A locking device according to claim 1, wherein said operating lever (7) has a laterally L-shaped slit (9) through which said elastic engaging piece (10) is integrally formed below said one terminal part (7a), said projecting part (11) is a pin integrally formed on a lateral surface of said elastic engaging piece (10), said cylindrical retaining part of said frame has an upper guide wall (12) and a lower guide wall (13) integrally extending from upper and lower parts of a rear terminal edge thereof for permitting insertion of said one terminal part (7a) of said operating lever (7) therebetween and guiding movement of said one terminal part, said changeover slide surface (15) of said stopper wall (14) is angular, and said stopper wall (14) is formed integrally on said lower guide wall.
3. A locking device according to claim 1, further comprising a first retaining part (18a) formed on a surface of said opening-shutting knob (4) facing said frame (1), a second retaining part (18b) formed on a surface of said frame so as to face said first retaining part of said opening-shutting knob (4), and a compression coil spring (19) for return motion set in place between said first retaining part and said second retaining part.
4. A locking device according to claim 2, further comprising a first retaining part (18a) formed on a surface of said opening-shutting knob (4) facing said frame, a second retaining part (18b) formed on a surface of said frame so as to face said first retaining part of said opening-shutting knob (4), and a compression coil spring (19) for return motion set in place between said first retaining part and said second retaining part.
5. A locking device for a lid on a box, comprising:
  - a frame (1) fixed on the side of the lid and provided with a cylinder lock (3) having an eccentric shaft (3a);
  - an opening-shutting knob having a depressing claw part (4a) and pivotally supported on said frame;
  - a locking member (5) for locking on the side of said frame a striker (20) disposed on the side of the box;
  - an operating lever (7) having one terminal part thereof connected to said eccentric shaft (3a) of said cylinder lock (3) and the other terminal part (7b) serving to release a locked state of said locking member by interfering with said depressed claw part of said opening-shutting knob (4) during unlocking of said locking device;
  - a first retaining part (18a) formed on a surface of said opening-shutting knob (4) facing said frame;
  - a second retaining part (18b) formed on a surface of said frame (1) so as to face said first retaining part (18a) of said opening-shutting knob (4), and
  - a compression coil spring (19) for return motion set in place between said first retaining part (18a) and said second retaining part (18b).

FIG. 1

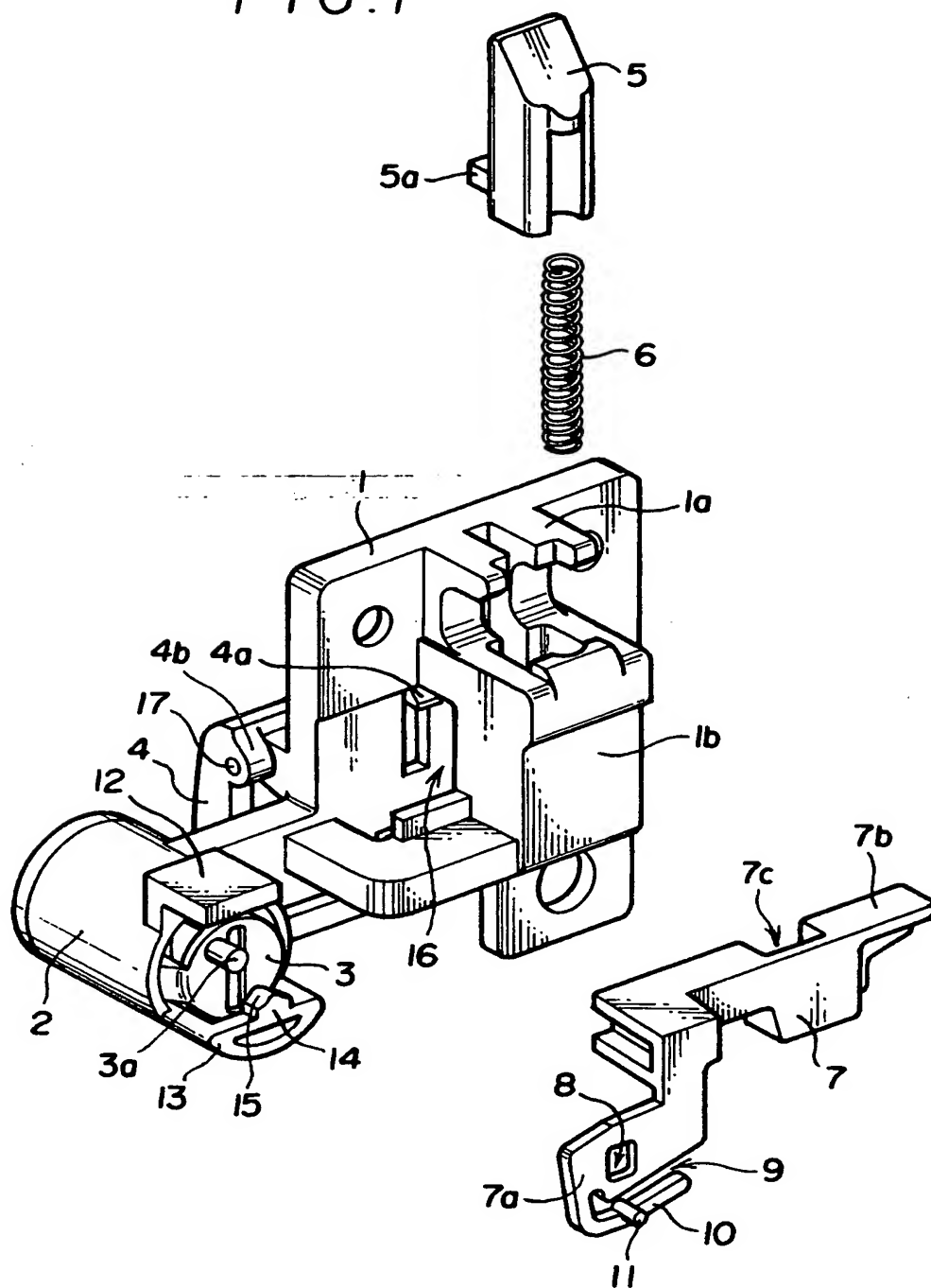


FIG. 2

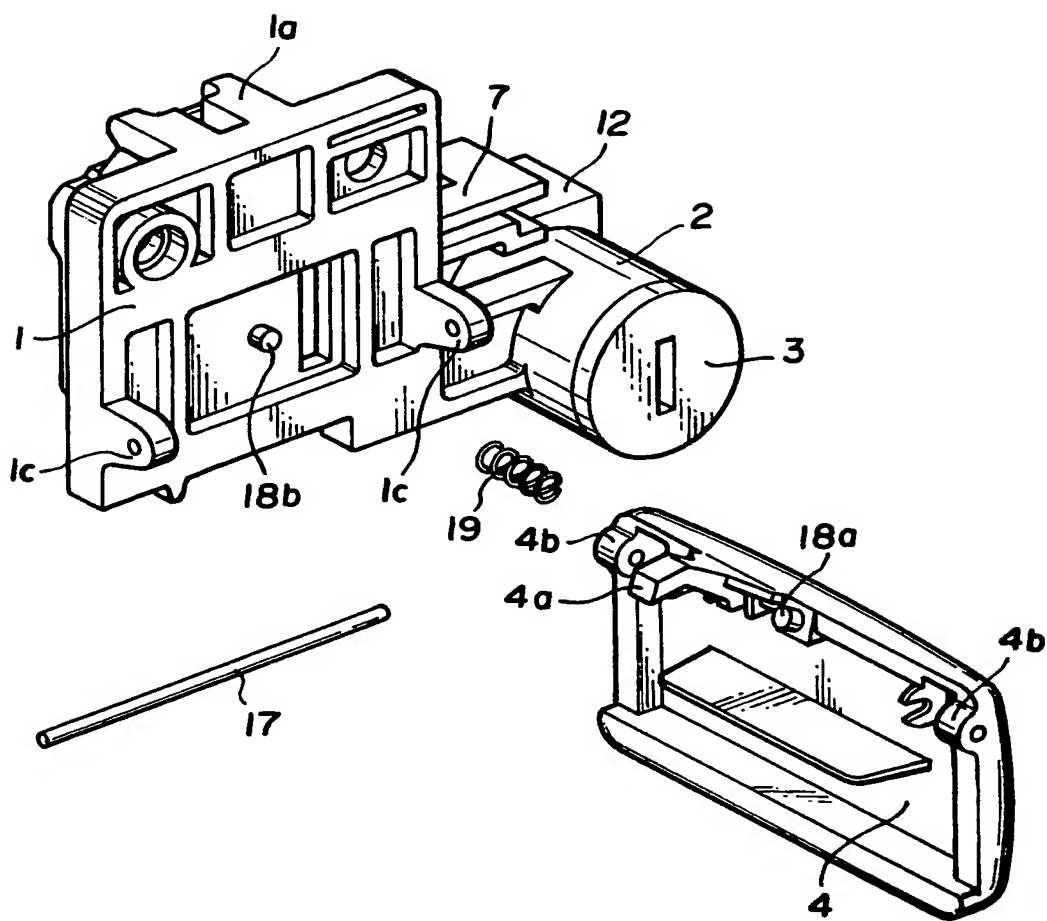


FIG. 3

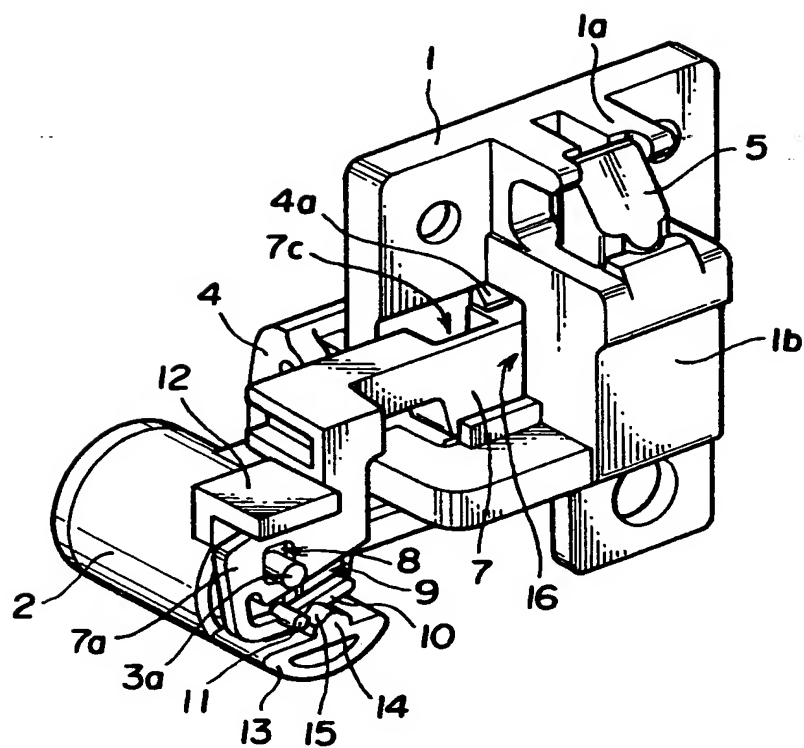


FIG. 4

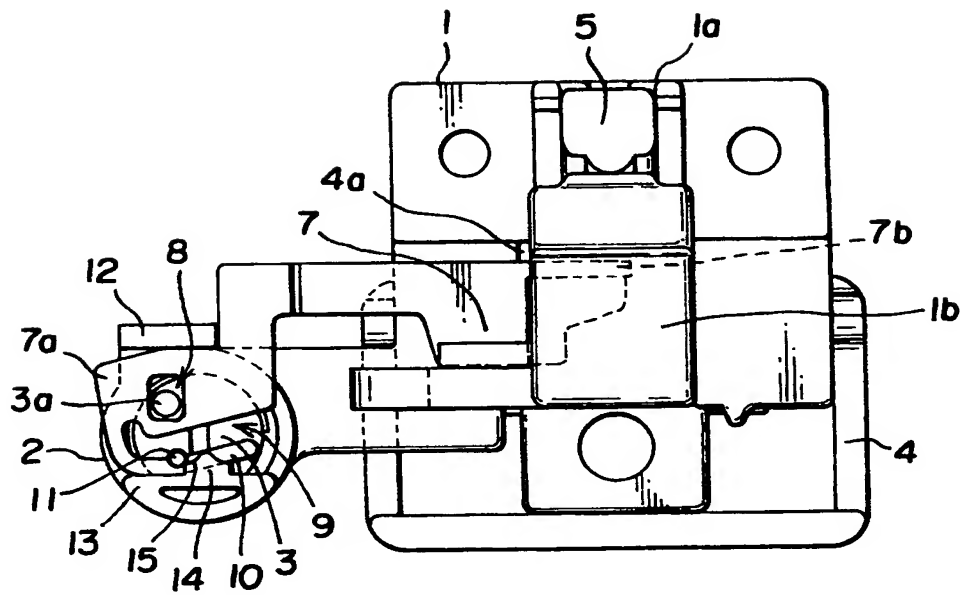


FIG. 5

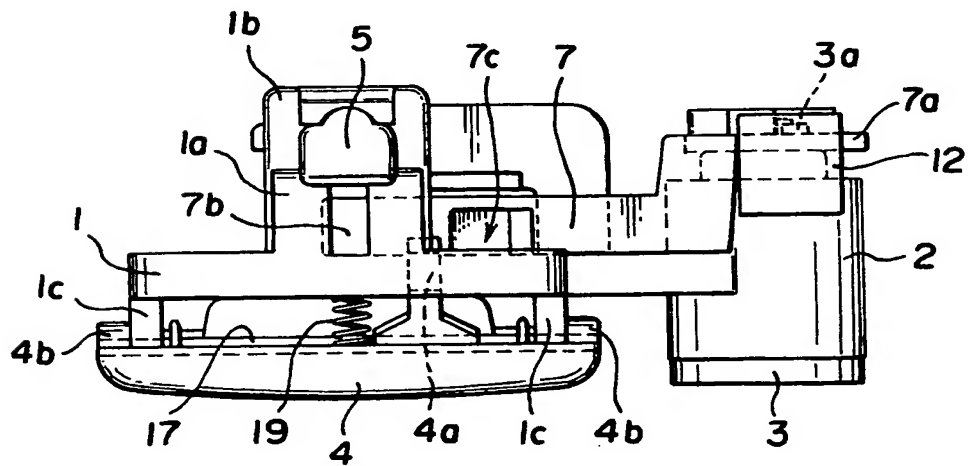


FIG. 6

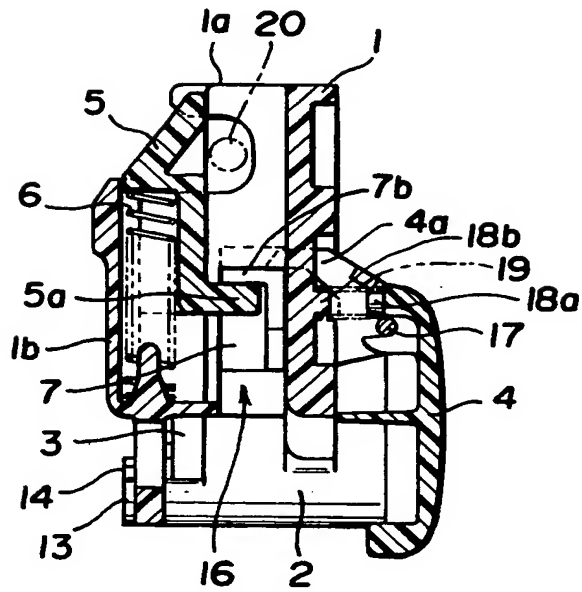


FIG. 7

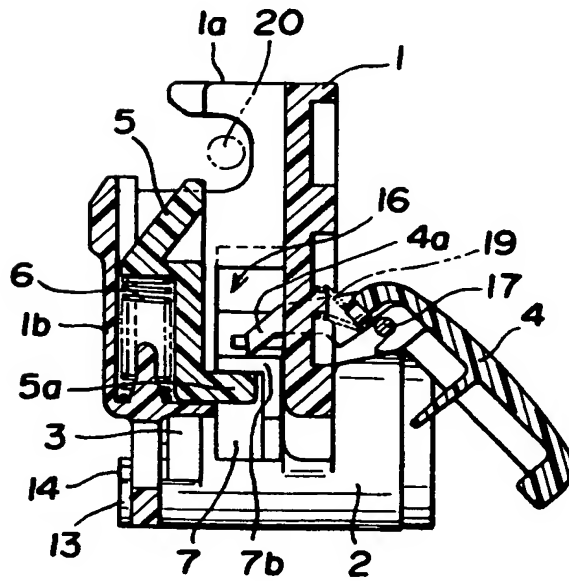


FIG. 8

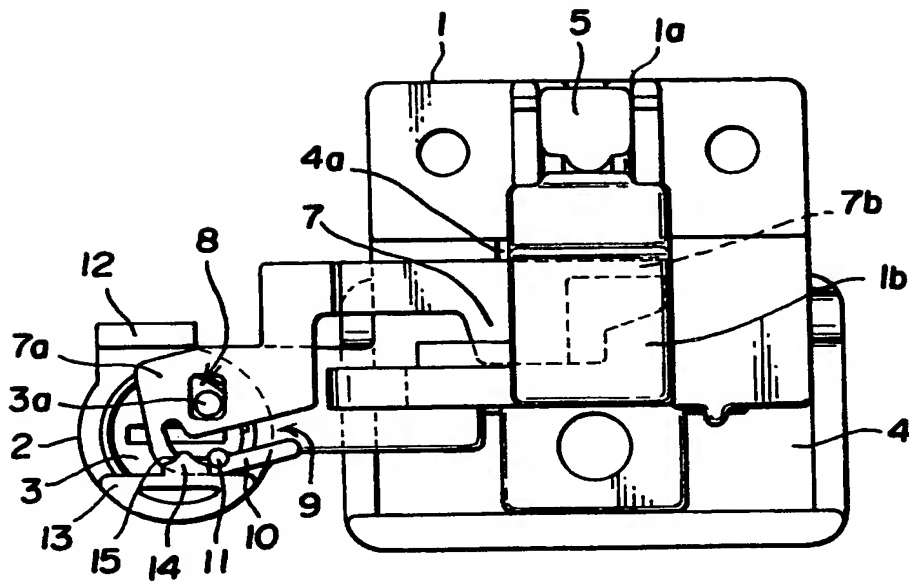
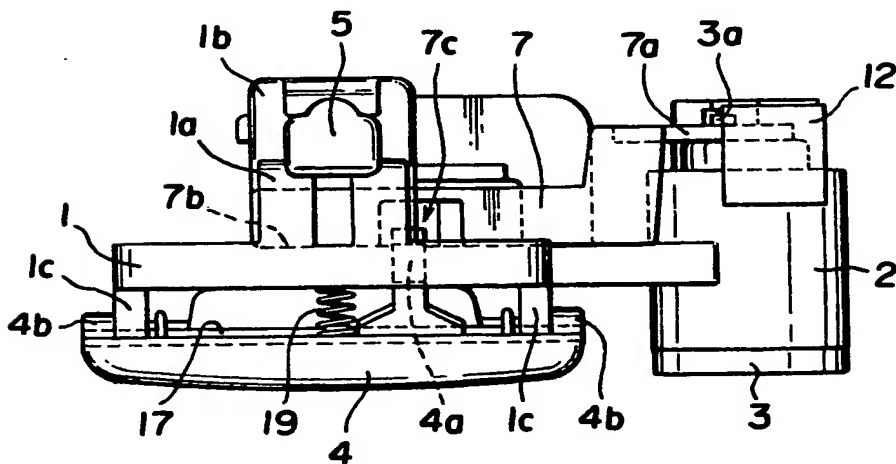


FIG. 9





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## EUROPEAN SEARCH REPORT

Application Number

EP 92 11 7331

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-2 570 556 (E. N. JACOBI) * the whole document *	1,5	E05B65/00 E05B65/12
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A	FR-A-2 375 413 (A. DUBOIS & CIE) * the whole document *	1,5	
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A	FR-A-2 531 919 (DAIMLER-BENZ) * the whole document *	1,5	
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A	GB-A-2 126 275 (FORD) * the whole document *	1,5	
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			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E05B
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 05 FEBRUARY 1993	Examiner KRABEL A.
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